

GEPHE SUMMARY

Gephebase Gene
prolyl endopeptidase (PREP)

Entry Status
Published

GepheID
GP00002108

Main curator
Courtier

PHENOTYPIC CHANGE

Trait Category
Morphology

Trait
Coloration (scales)

Trait State in Taxon A
lighter black

Trait State in Taxon B
darker black - lizards on Pigash lava flow

Ancestral State
Taxon A

Taxonomic Status
Intraspecific

Taxon A

Latin Name
Uta stansburiana

Common Name
-

Synonyms
Uta antiqua; Uta stellata; Uta stansburiana Baird & Girard, 1852; USNM 12666; USNM:12666

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Phrynosomatidae; Phrynosomatinae; Uta

Parent
Uta () - (Rank: genus)

NCBI Taxonomy ID
43653

is Taxon A an Intraspecies?
No

Taxon B

Latin Name
Uta stansburiana

Common Name
-

Synonyms
Uta antiqua; Uta stellata; Uta stansburiana Baird & Girard, 1852; USNM 12666; USNM:12666

Rank
species

Lineage
cellular organisms; Eukaryota; Opisthokonta; Metazoa; Eumetazoa; Bilateria; Deuterostomia; Chordata; Craniata; Vertebrata; Gnathostomata; Teleostomi; Euteleostomi; Sarcopterygii; Dipnotetrapodomorpha; Tetrapoda; Amniota; Sauropsida; Sauria; Lepidosauria; Squamata; Bifurcata; Unidentata; Episquamata; Toxicofera; Iguania; Phrynosomatidae; Phrynosomatinae; Uta

Parent
Uta () - (Rank: genus)

NCBI Taxonomy ID
43653

is Taxon B an Intraspecies?
No

GENOTYPIC CHANGE

Generic Gene Name
PREP

Synonyms
PE; PEP

String
9606.ENSP00000358106

Sequence Similarities
Belongs to the peptidase S9A family.

GO - Molecular Function
GO:0004175 : endopeptidase activity
GO:0004252 : serine-type endopeptidase activity
GO:0070012 : oligopeptidase activity
GO:0070008 : serine-type exopeptidase activity
GO:0008236 : serine-type peptidase activity

GO - Biological Process
GO:0006508 : proteolysis

GO - Cellular Component
GO:0005737 : cytoplasm

UniProtKB Homo sapiens
P48147

GenebankID or UniProtKB

GO:0005829 : cytosol
GO:0016020 : membrane
GO:0005634 : nucleus

Presumptive Null

No

Molecular Type

Cis-regulatory

Aberration Type

Unknown

Molecular Details of the Mutation

no coding mutation associated with the phenotype - 2 differentiated SNPs in introns and one is a synonymous change.

Experimental Evidence

-

Main Reference

The Genetic Basis of Adaptation following Plastic Changes in Coloration in a Novel Environment. (2018)

Authors

Corl A; Bi K; Luke C; Challa AS; Stern AJ; Sinervo B; Nielsen R

Abstract

Phenotypic plasticity has been hypothesized to precede and facilitate adaptation to novel environments [1-8], but examples of plasticity preceding adaptation in wild populations are rare (but see [9, Å 10]). We studied a population of side-blotched lizards, *Uta stansburiana*, living on a lava flow that formed 22,500 years ago [11] to understand the origin of their novel melanic phenotype that makes them cryptic on the black lava. We found that lizards living on and off of the lava flow exhibited phenotypic plasticity in coloration but also appeared to have heritable differences in pigmentation. We sequenced the exomes of 104 individuals and identified two known regulators of melanin production, PREP and PRKAR1A, which had markedly increased levels of divergence between lizards living on and off the lava flow. The derived variants in PREP and PRKAR1A were only found in the lava population and were associated with increased pigmentation levels in an experimental cohort of hatchling lizards. Simulations suggest that the derived variants in the PREP and PRKAR1A genes arose recently and were under strong positive selection in the lava population. Overall, our results suggest that ancestral plasticity for coloration facilitated initial survival in the lava environment and was followed by genetic changes that modified the phenotype in the direction of the induced plastic response, possibly through de novo mutations. These observations provide a detailed example supporting the hypothesis that plasticity aids in the initial colonization of a novel habitat, with natural selection subsequently refining the phenotype with genetic adaptations to the new environment. VIDEO ABSTRACT.

Copyright Å© 2018 Elsevier Ltd. All rights reserved.

Additional References

RELATED GEPHE

Related Genes

1 (protein kinase cAMP-dependent type I regulatory subunit alpha (PRKAR1A))

Related Haplotypes

No matches found.

COMMENTS

@Plasticity - PREP is known to digest alpha melanocyte stimulating hormone (a-MSH) = a hormone that stimulates the production of melanin